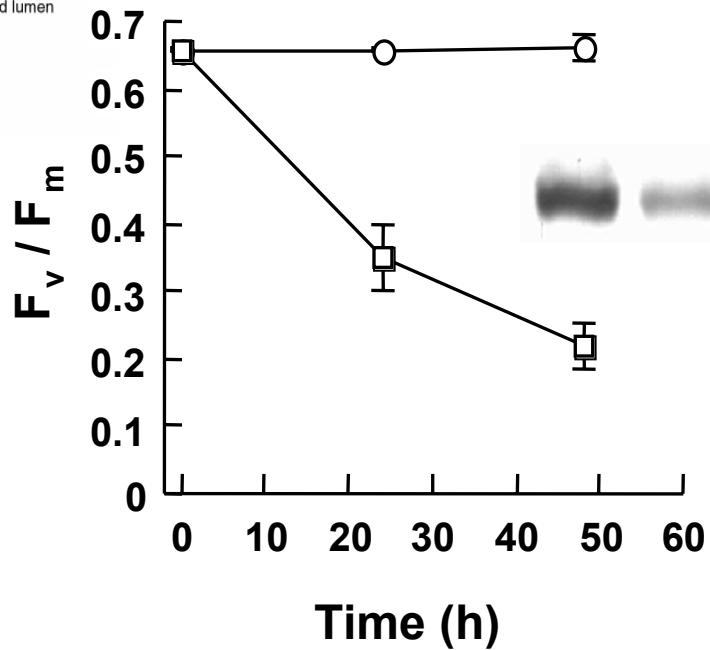
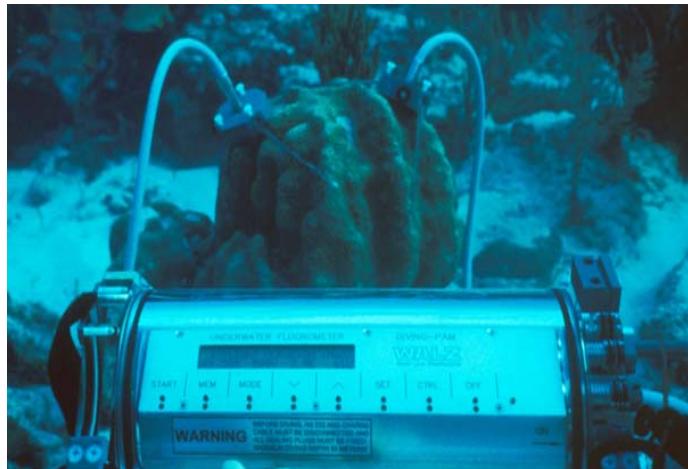
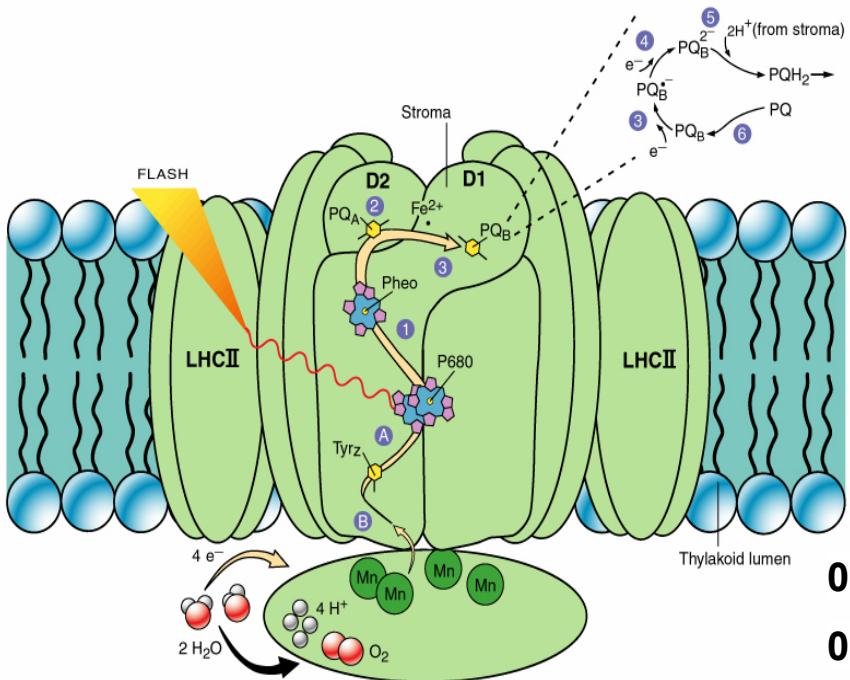
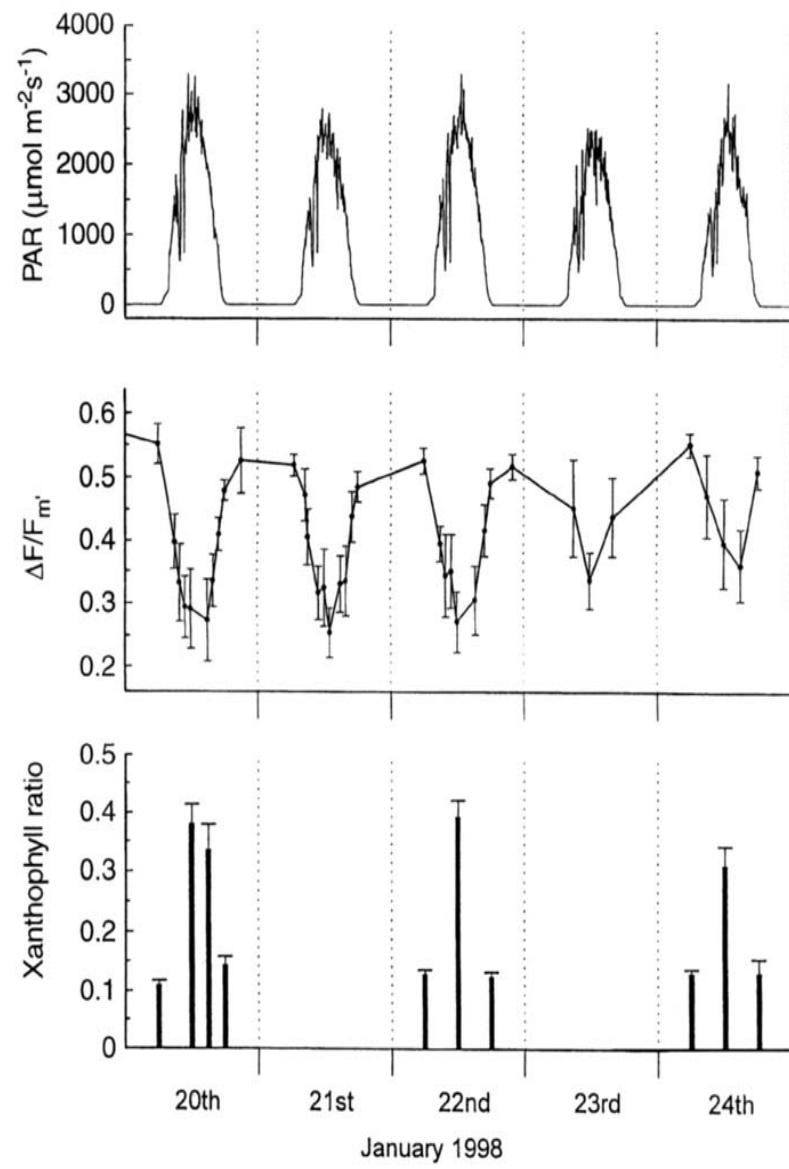


**Seasonal fluctuations in
photosynthetic performance in reef
corals :**

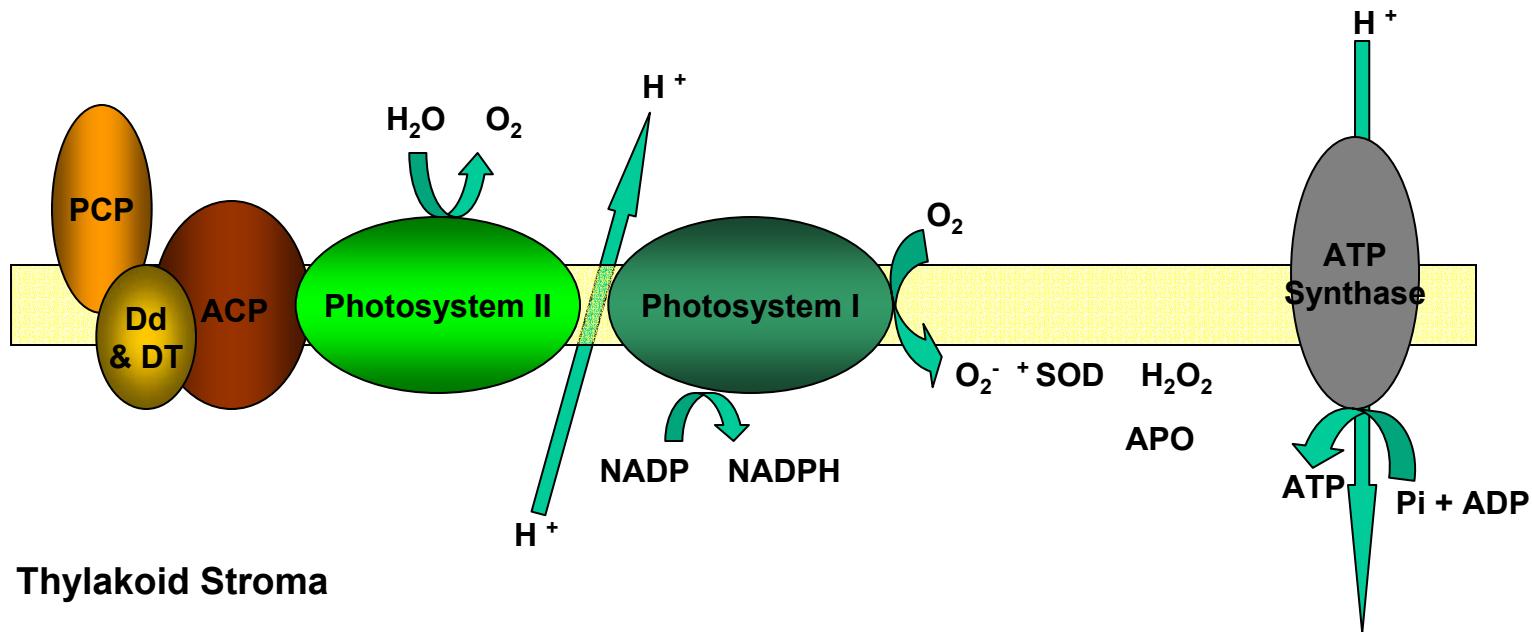
**implications for long-term monitoring
and coral bleaching**



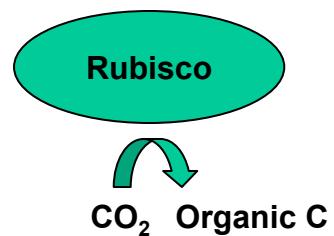




Thylakoid Lumen

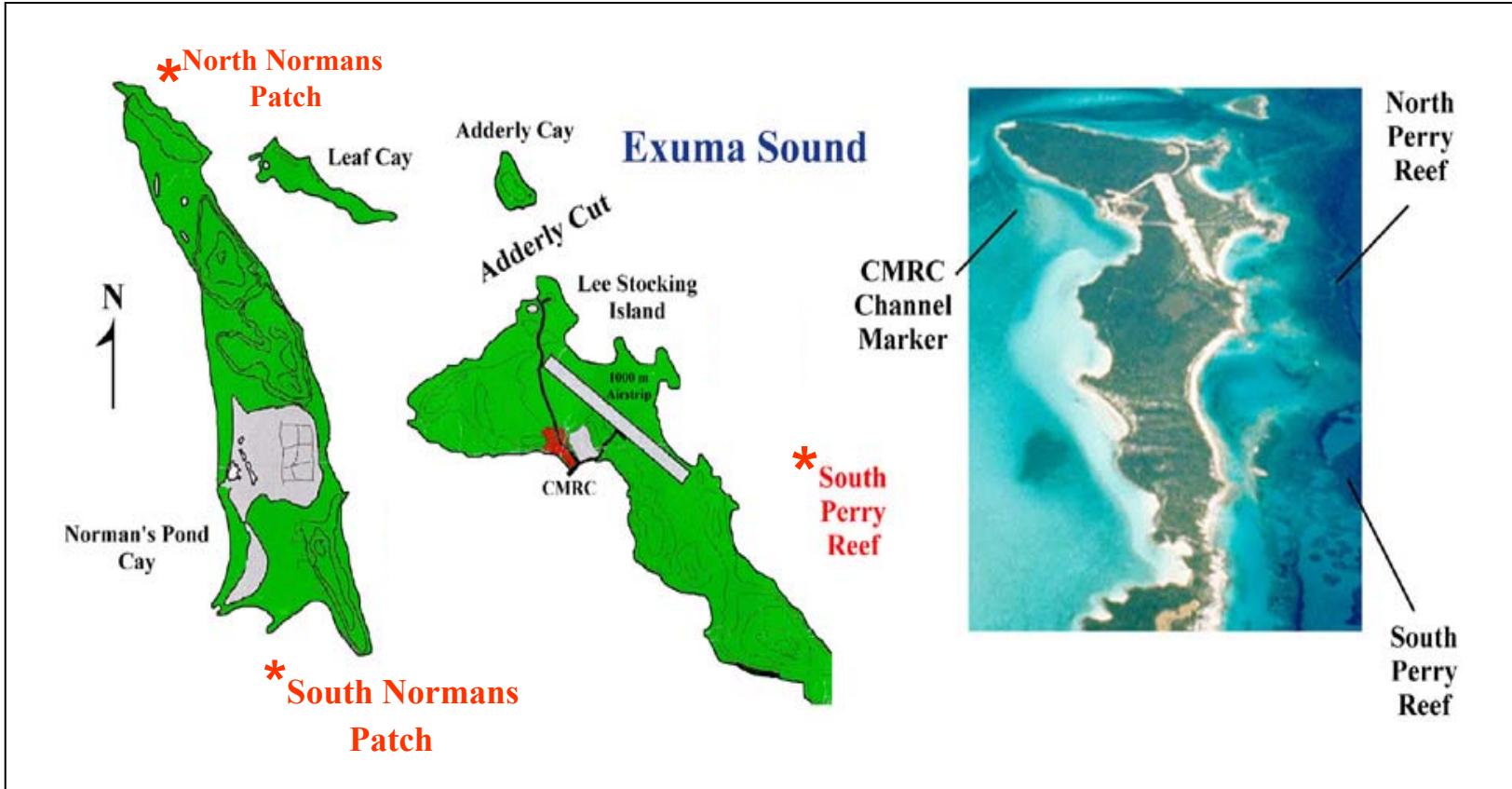


Thylakoid Stroma



Primary Questions

- Does the photosynthetic “efficiency” of reef building corals change on a seasonal scale?
- Are there any intraspecific and/or interspecific differences?
- What is the relationship between environmental and biological parameters to photosynthetic activity on a seasonal scale?
- Can this scope provide further insight into how we view patterns of environmental perturbation..... should we keep doing this?



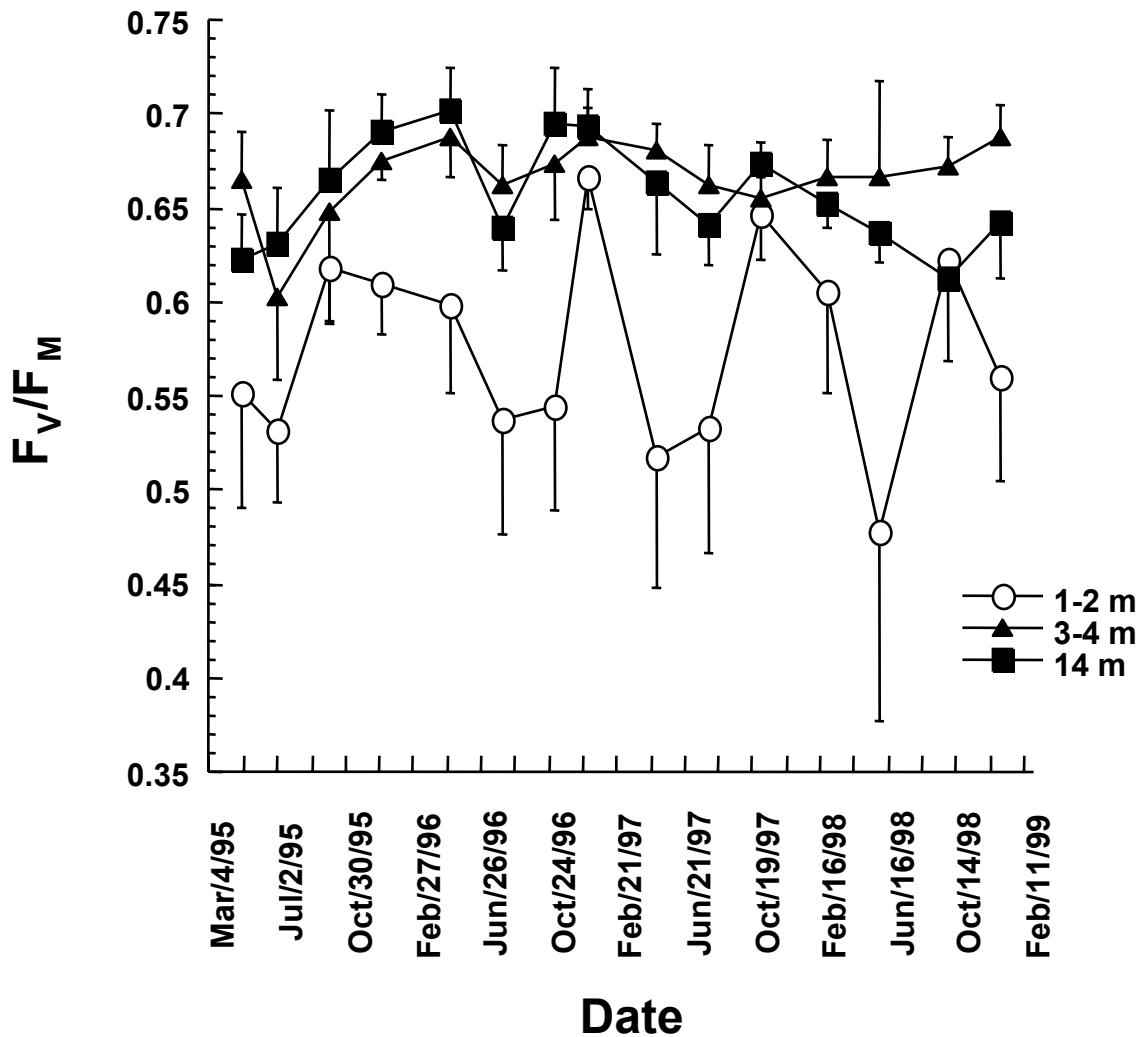


Montastraea faveolata

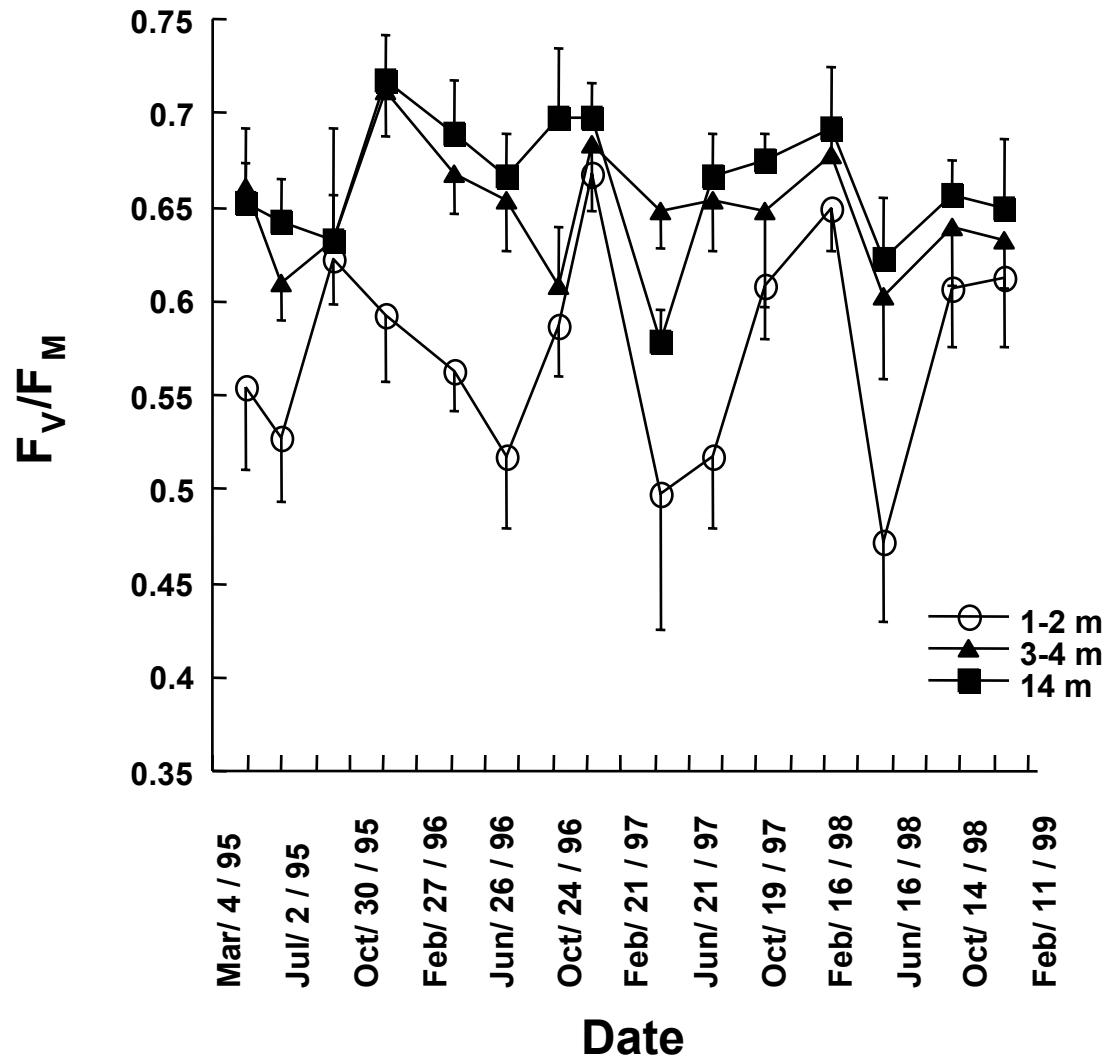


Montastraea annularis

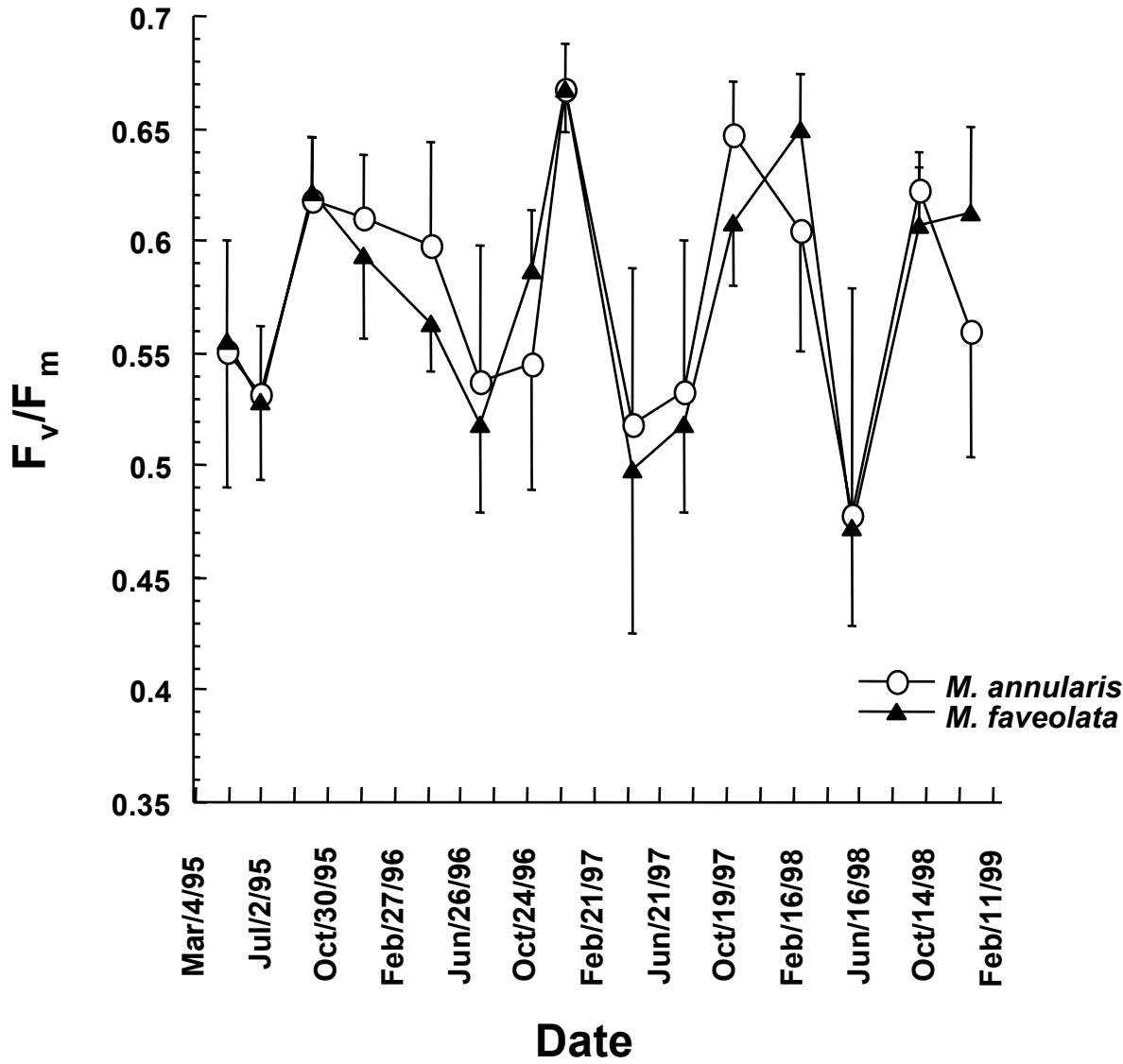
M. annularis



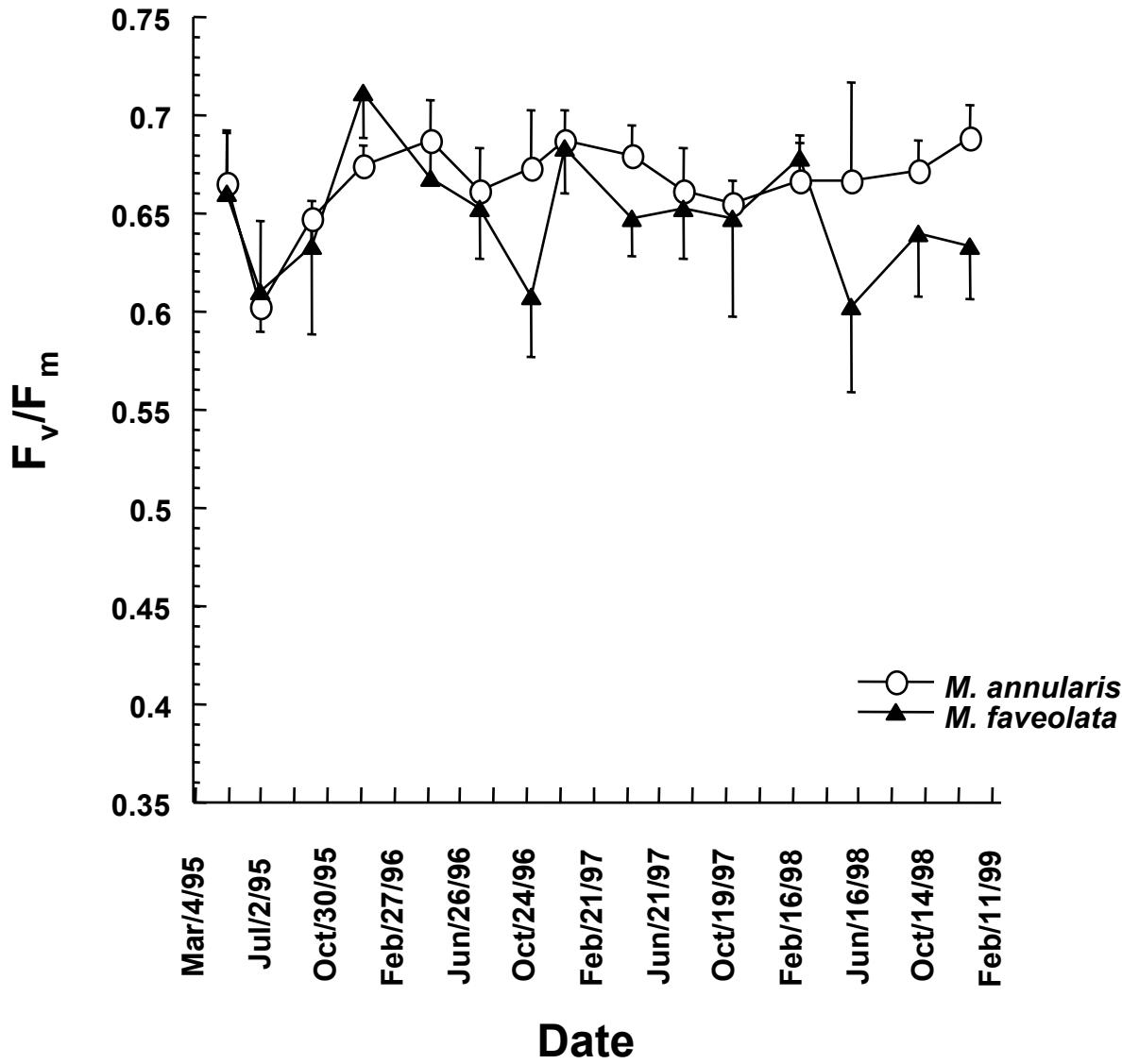
M. faveolata



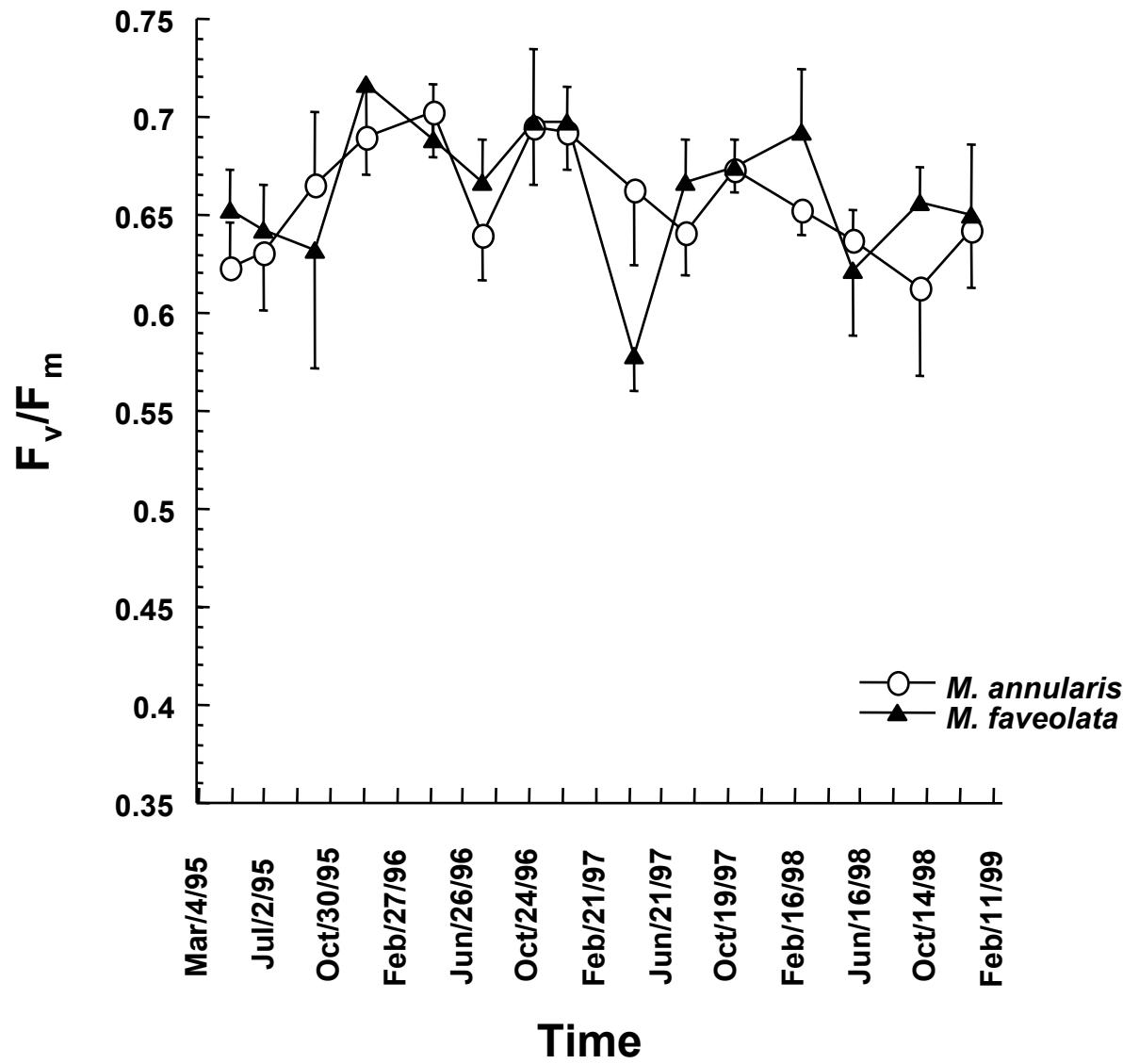
M. annularis & M. faveolata 1-2 m



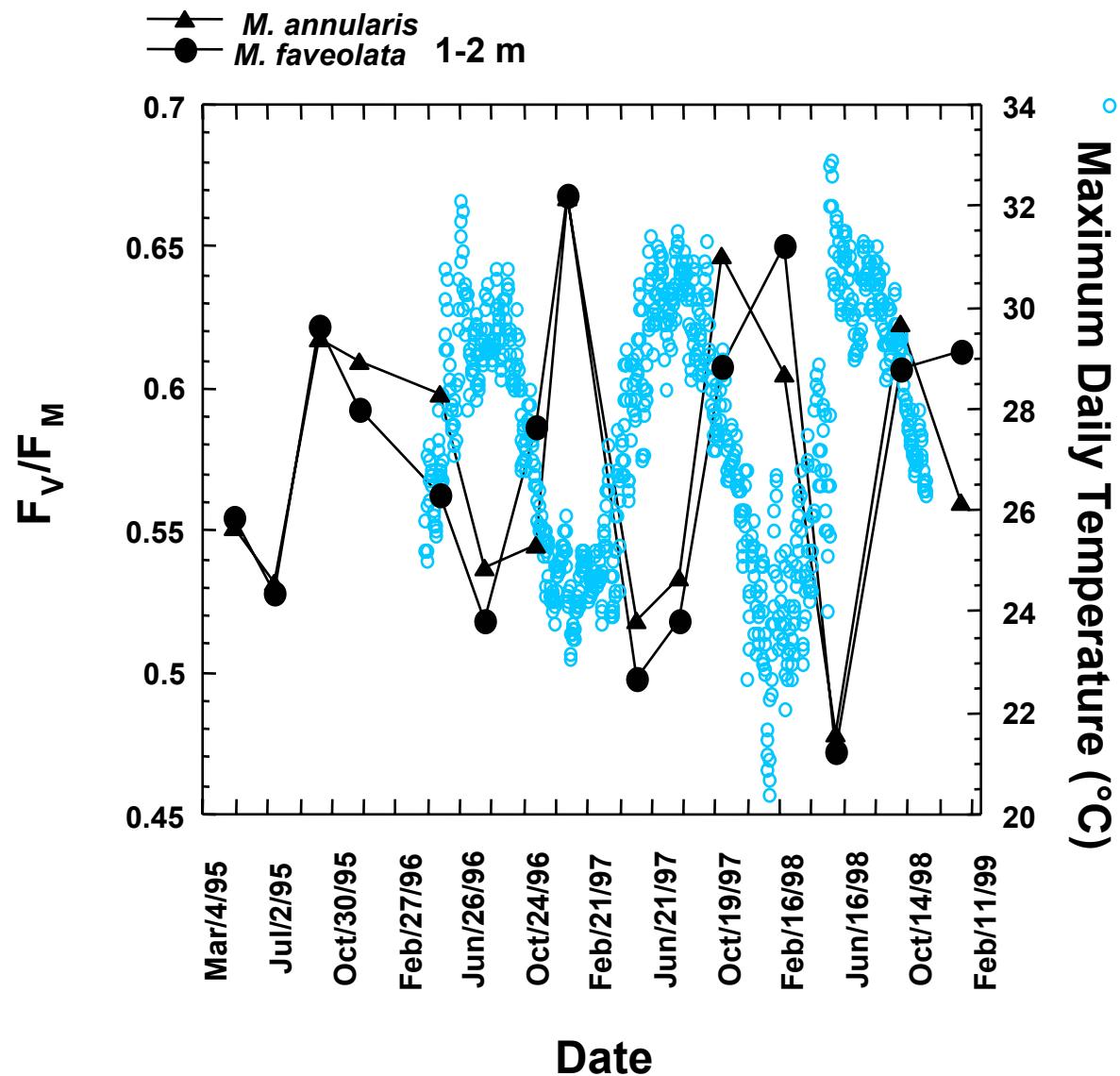
M. annularis & M. faveolata 3-4 m



M. annularis & *M. faveolata* 14 m

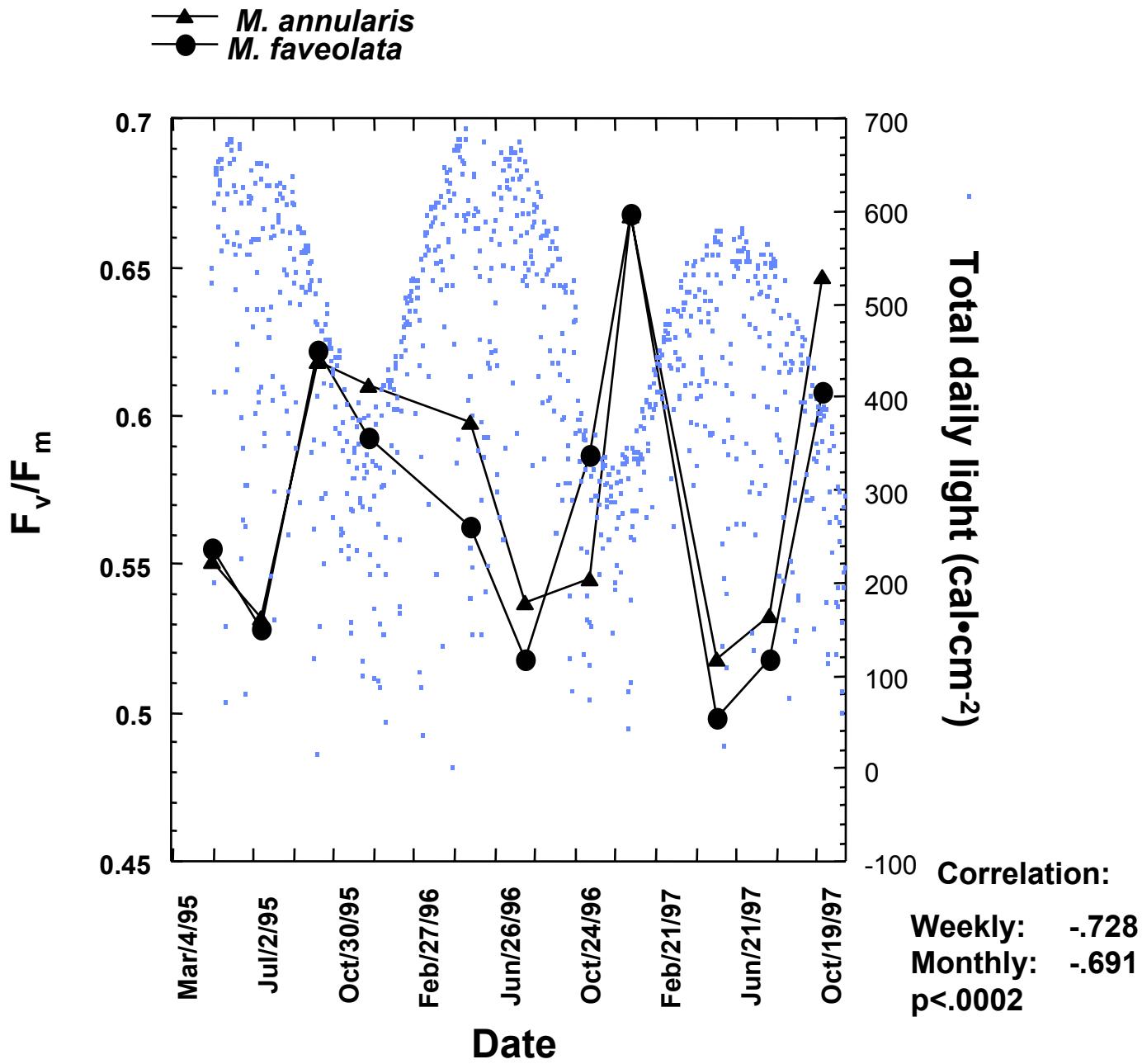


- What is the relationship between environmental and biological parameters to photosynthetic activity on a seasonal scale?

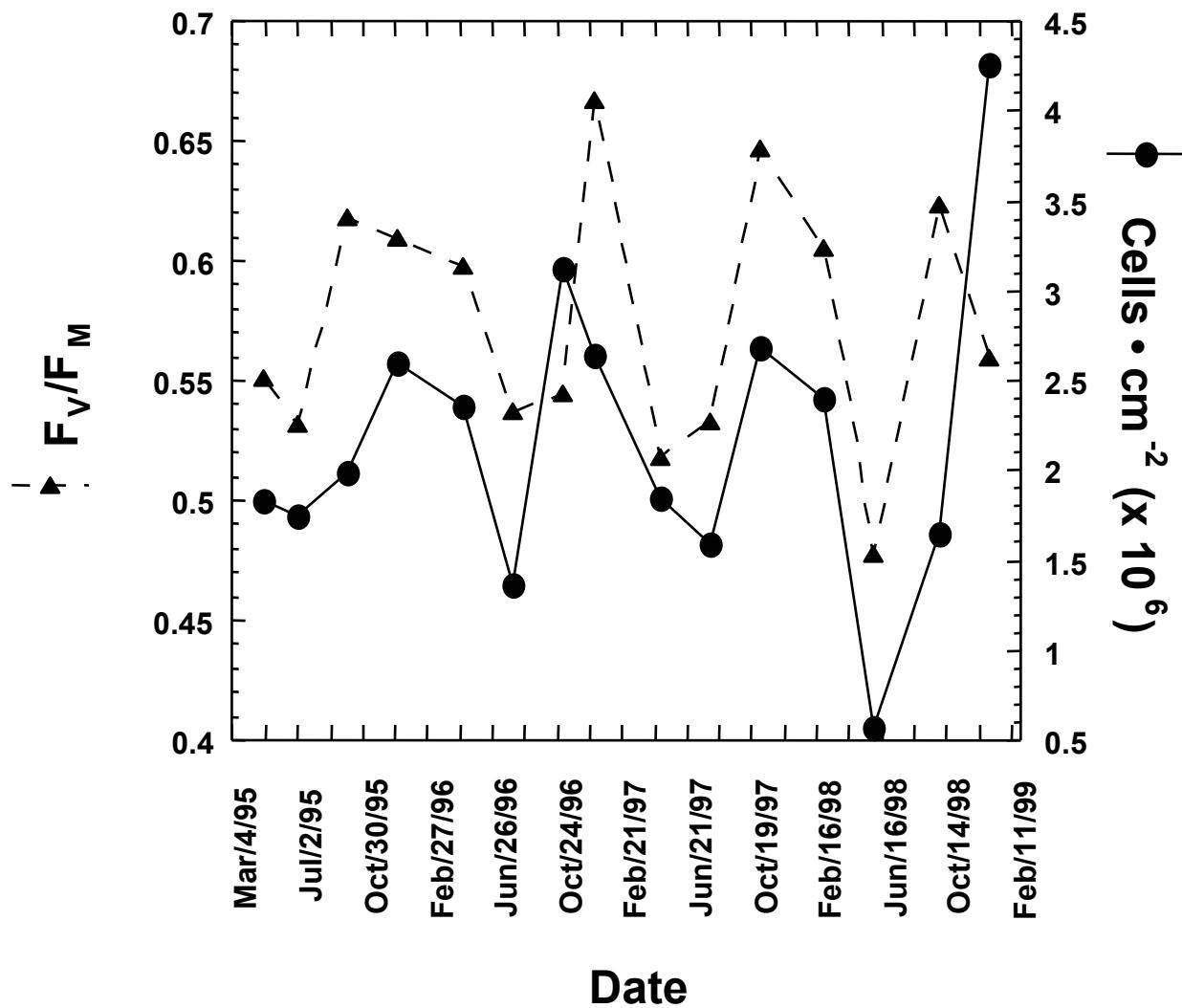


Correlation of mean temperature to F_v/F_m for all sites:

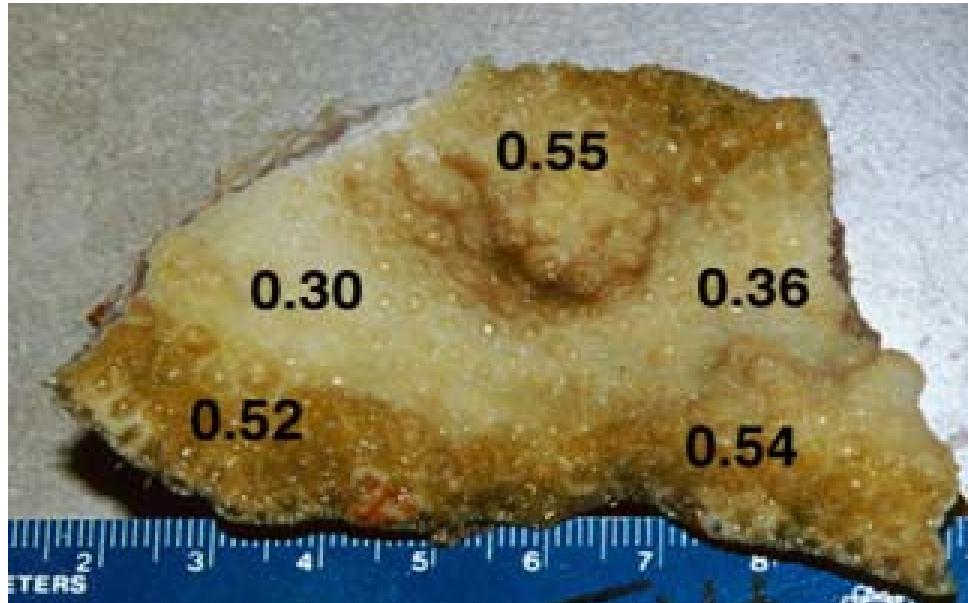
Time interval :	Daily	Weekly	Monthly
Correlation	-.497	-.484	-.467
P -value	<.0001	.0001	.0002



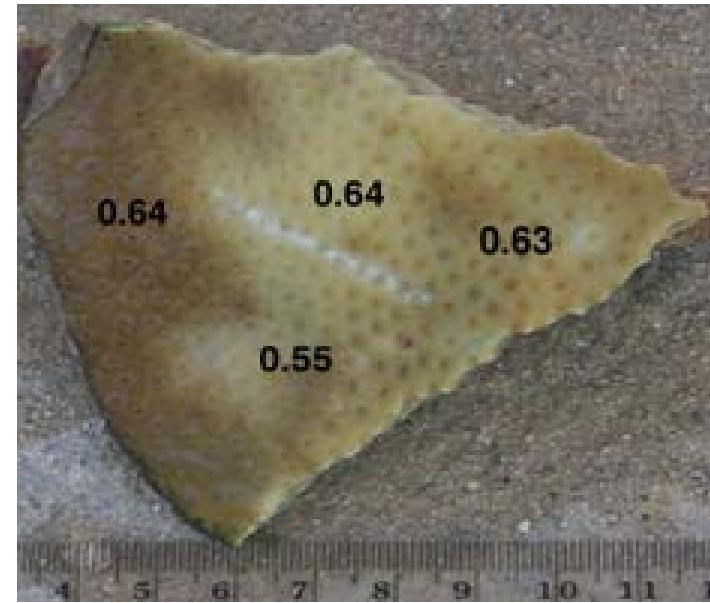
M. annularis 1-2 m



Differential patterns of Fv/Fm in bleached corals

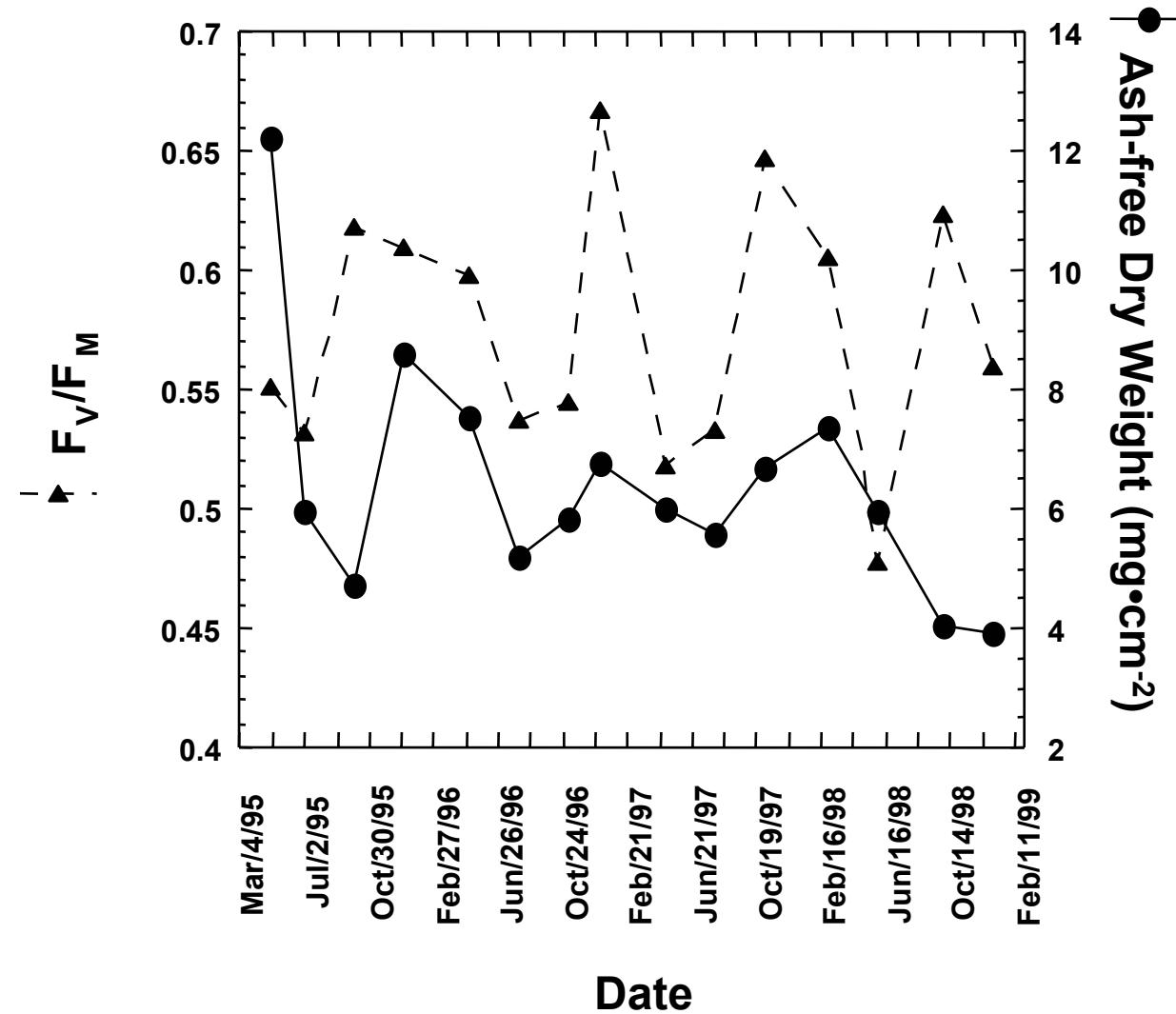


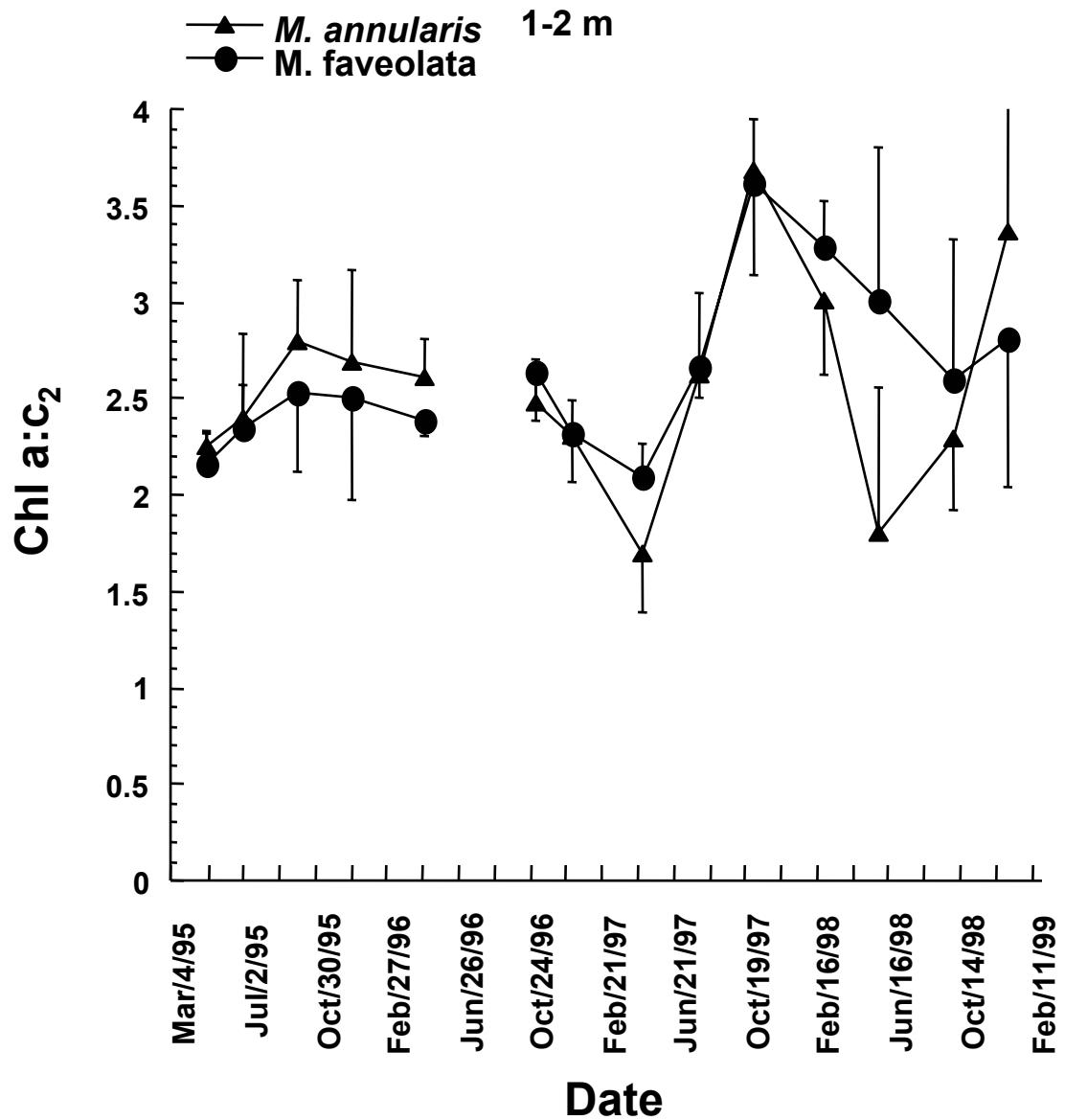
Summer

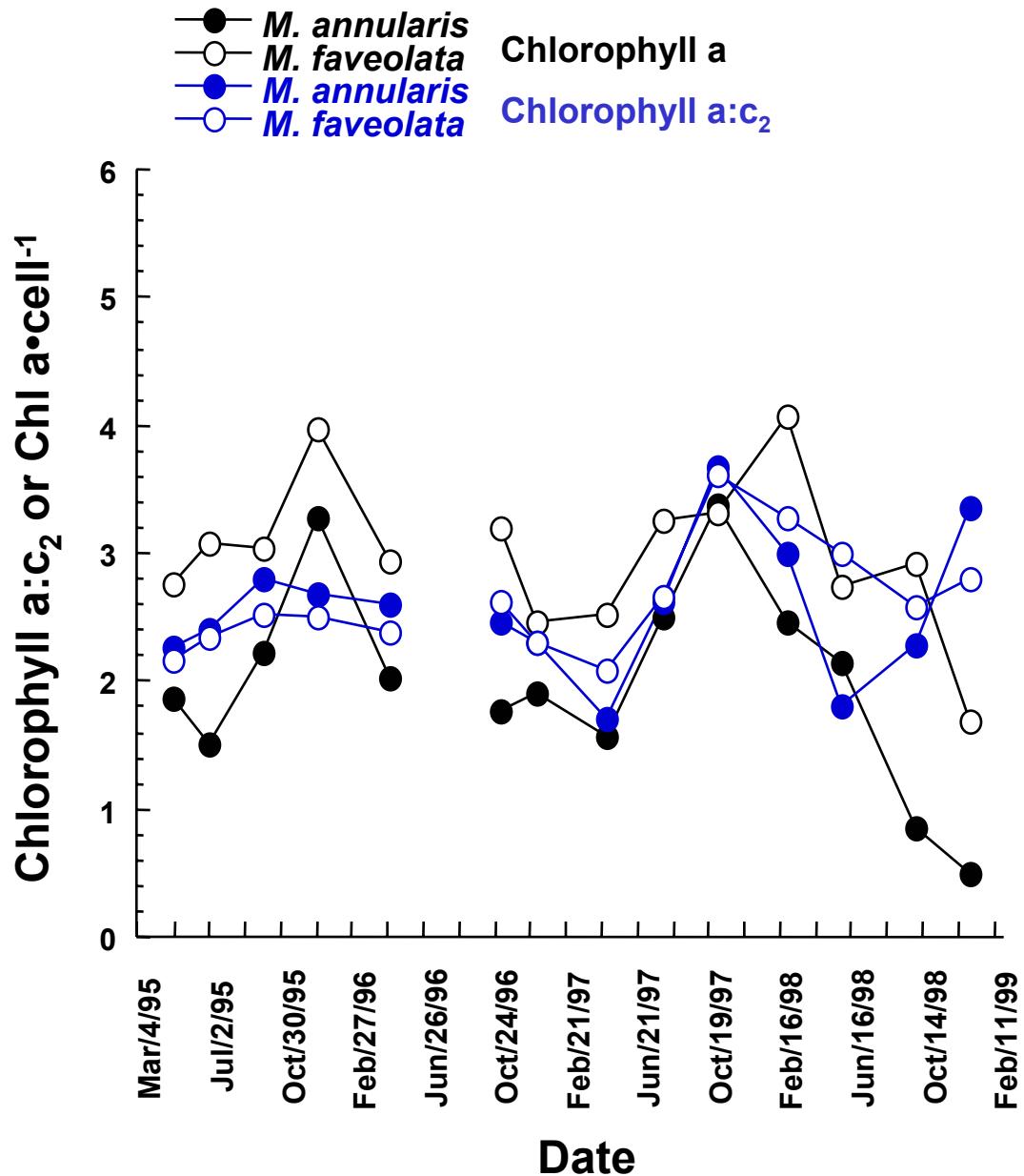


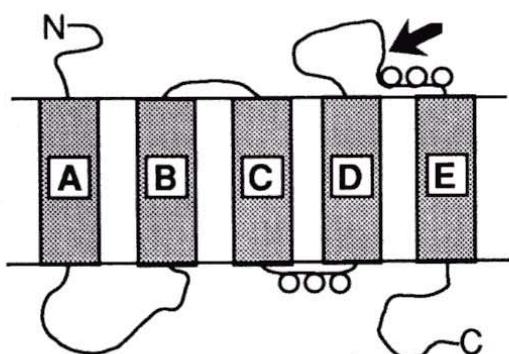
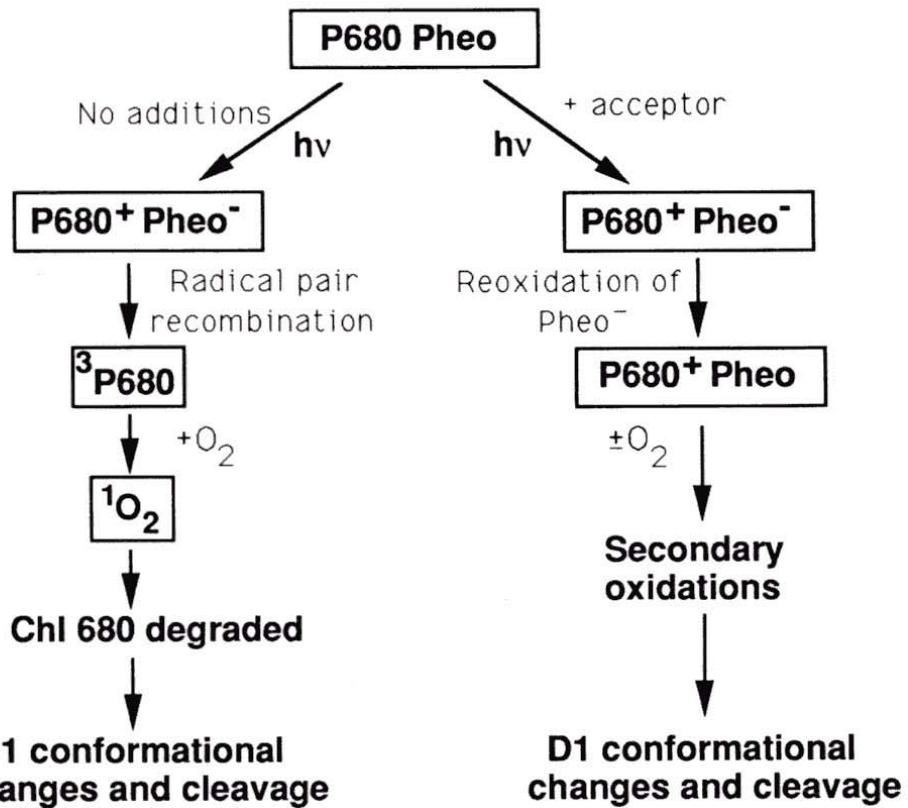
Fall

M. annularis 1-2 m

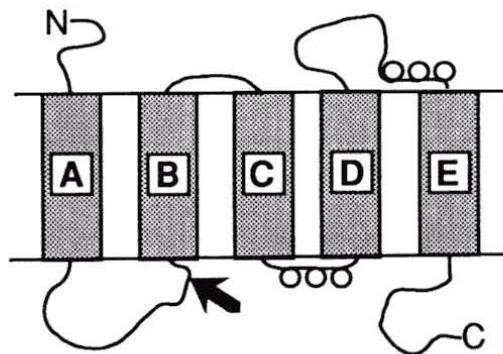








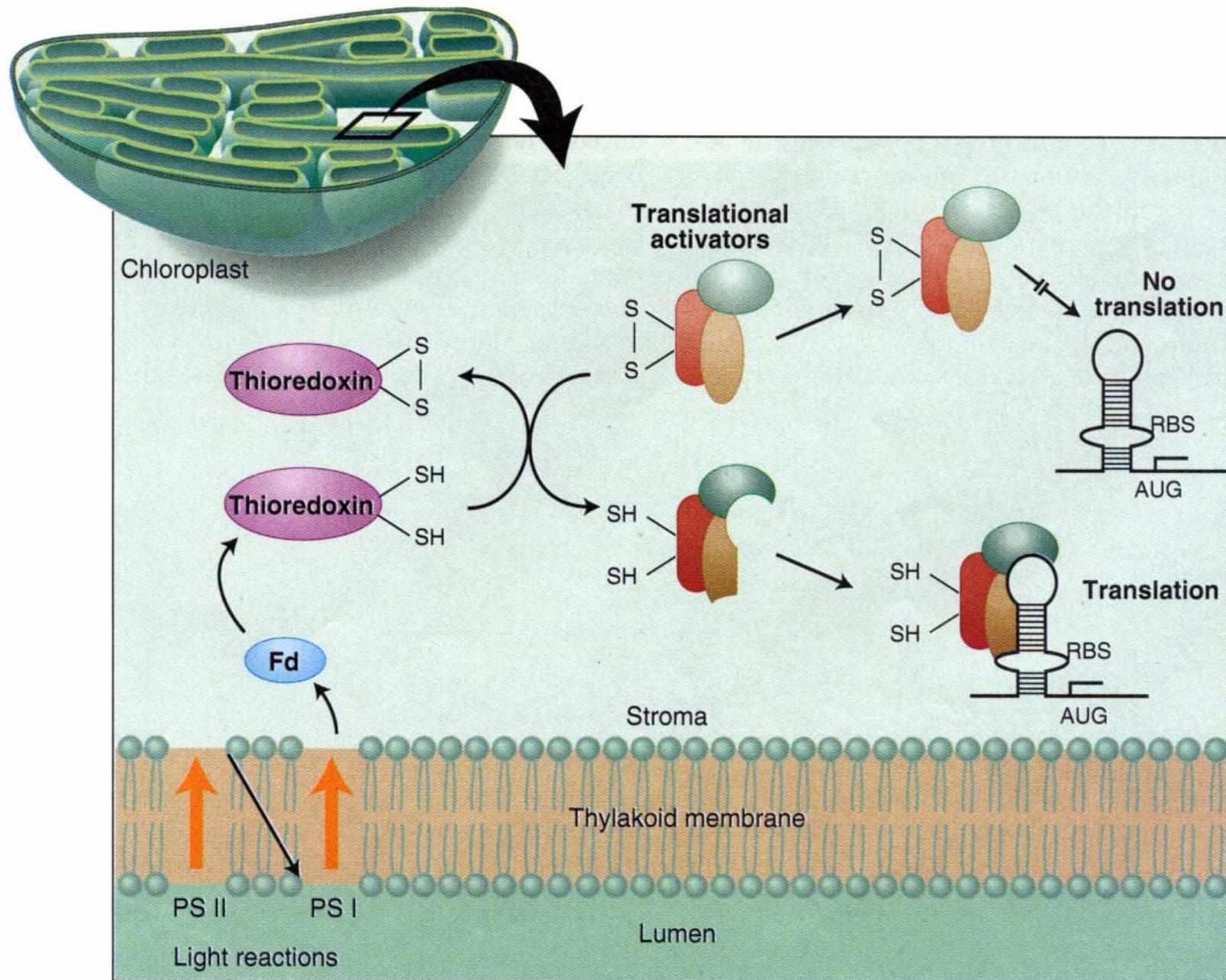
ACCEPTOR SIDE
PHOTOINHIBITION



DONOR SIDE
PHOTOINHIBITION

M. annularis

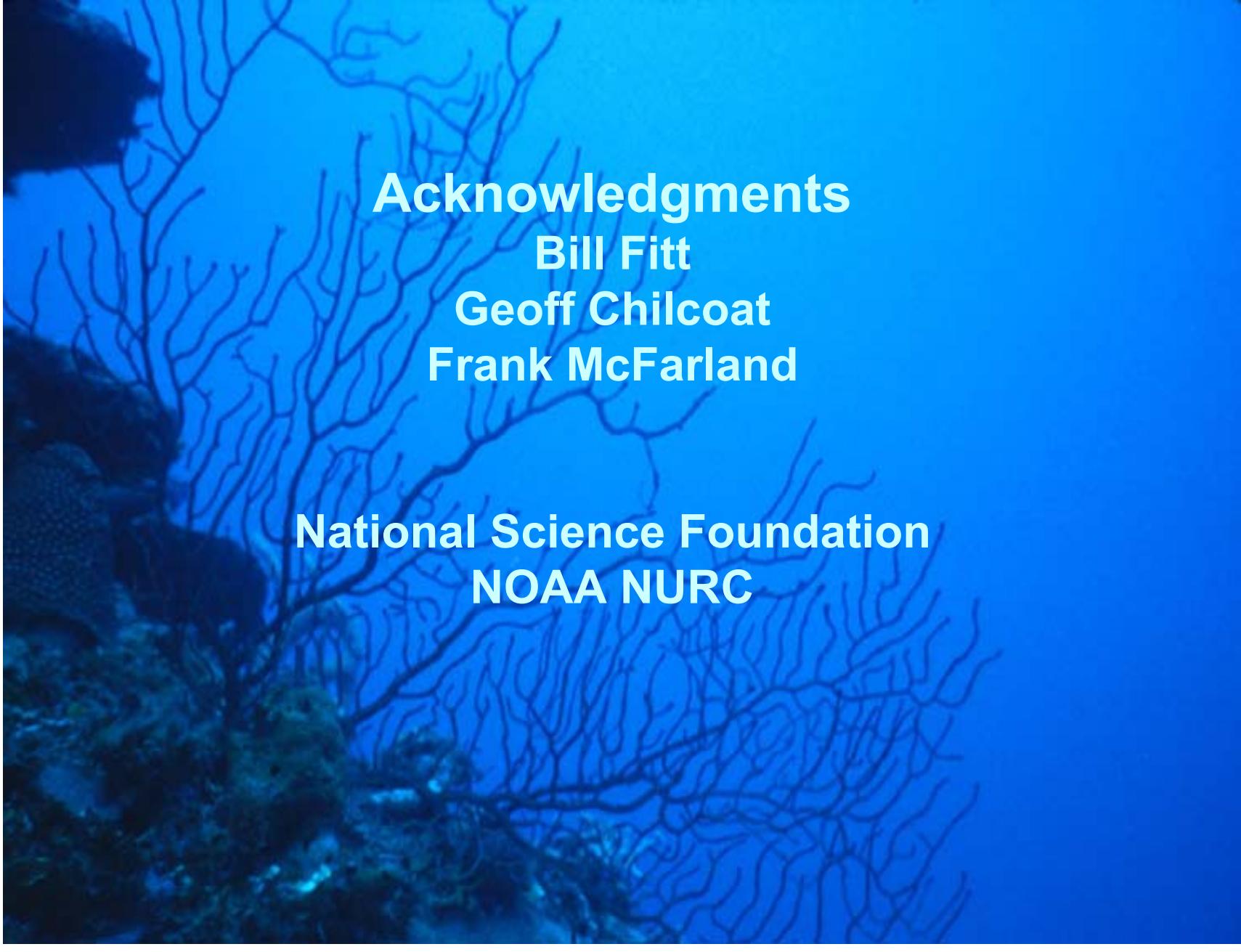
	1	11	21	31	41	51
Field B1 d-e	GGSLFSAMH	GSLVXSSLLAET	AGDISLNW	GYKFGQEQDETYSISAAHGYFGRLIFQYASFN		
135 d-e loop	-----H	GSLVTSSLLAE	SAGDISLNW	GYKFGQEQDETYSISAAHGYFGRLIFQYASFN		
64 d-e loop	-----	GSLVTSSLLAE	SAGDISLNW	GYKFGQEQDETYSISAAHGYFGRLIFQYASFN		
141 d-e loop	-----	GSLVTSSLLAE	SAGDISLNW	GYKFGQEQDETYSISAAHGYFGRLIFQYASFN		
80 d-e loop	-----	GSLVTSSLLAE	SAGDISLN	GYKFGQEQDETYSISAAHGYFGRLIFQYASFN		
Consensus		gslvtssllae	sagdisln	gykfgqeqdetysisaaahgyfgrlifqyasn		
	61	71	81	91	101	111
Field B1 d-e	NSRSLHFFLAAPVIG					
135 d-e loop	NSRSLHFFLAAPV	I	-			
64 d-e loop	NSRSLHFFLAAPV	I	-			
141 d-e loop	NSRSLHFFLAAPV	I	-			
80 d-e loop	NFRSLHXFLAAPV	I	-			
Consensus	nsrslhfflaapvi					



Conclusions

- Photosynthetic efficiency changes significantly and predictably on a seasonal cycle.
- There are intraspecific as well as interspecific differences in photosynthetic efficiency.
- Patterns of fluorescence correlate strongly to both light as well as temperature.
- Seasonal patterns of photosynthesis closely resemble other biological parameters measured on the same scale (e.g. Cell number and biomass).

- Seasonal data such as these indicate that some periods of environmental stress (e.g. coral bleaching) are end points of a long-term physiological cycle.

A photograph of an underwater environment, likely a coral reef. The water is a deep blue, and the foreground shows several thin, branching structures of coral or sea fan. The lighting creates a soft glow around the branches.

Acknowledgments

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